Chapter 7 Memory - Summary Psychology : Themes and Variations

Introduction to Psychology (York University)

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Chapter 7: Human Memory

Two kinds of memory: memory for general information (*semantic memory*) and memory for personal events (*episodic memory*).

Three key processes involved in memory:
1) **Encoding:** Forming a memory code (requires attention).
2) **Storage:** Maintaining encoded information in memory over time.
3) **Retrieval:** Recovering information from memory storage.

Encoding: Getting Information into Memory

The Role of Attention

- **Attention:** Focusing awareness on a narrowed range of stimuli or events.
- Attention is selective.

Models of Selective Attention:
- *Early-selection models* propose that input is filtered before meaning is even processed.
- *Late selection models* hold that filtering occurs after the processing of meaning.
- The 'cocktail party phenomenon' suggests that input is screened late in mental processing. However, people have flexibility where they place their attention filter.

Levels of Processing

- **Levels of processing theory:** Proposes that deeper levels of processing result in longer-lasting memory codes.
- There is shallow processing, intermediate processing, and deep processing.
- There is also retention at the three levels of processing. These involve structural, phonemic and semantic encoding correspondingly. In order of progressively better attention. They represent the structure, sound, and meaning of words, respectively.
* Refer to pg 9
- Shallow processing would be something like emphasizing the physical structure of the stimulus such as a word – whether it's written in capital letters or not.

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Enriching Encoding

- Semantic encoding can often be enhanced through a process called **elaboration** – linking stimulus to other information at the time of encoding. This helps people better remember information.
- **Visual imagery** to represent words can also be used to enrich coding.
- High-imagery words (easier to form an image of) are a lot easier to remember than low-imagery words.
- **Dual-coding theory:** Paivio's theory that memory is enhanced by forming semantic and visual codes, since either can lead to recall (two codes better than one!)
- Making material personally relevant can also enrich encoding. This is called **self-referent encoding**.

Storage: Maintaining Information in Memory

The Atkinson and Shiffrin Model of Memory Storage:

- Atkinson and Shiffrin proposed that memory is made up of three information stores.

→ **Sensory memory** can hold a large amount of information for just a fraction of a second before a small portion of it is selected for longer storage.
→ **Short-term memory** has a limited capacity, and unless aided by rehearsal, its storage duration is brief.
→ **Long-term memory** can store an apparently unlimited amount of information for indeterminate periods.

Sensory Memory

- Sensory memory forms automatically, without attention or interpretation.
- Example: When u spin a phullchari in circles, you can see a complete circle even though it's just a point spinning. This is because the sensory memory preserves the sensory image long enough for you to perceive a continuous circle.
- Refer to Sperling's study of sensory memory on pg 15.

Short-Term Memory

- Can maintain unrehearsed information for up to about 30 seconds. Longer if rehearsed.
- Capacity of Storage → "The magical number 7, plus or minus 2" said by George Miller. But Cowan shifted this belief to "4, plus or minus 1"

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- **Working memory:** A limited memory storage system that temporarily maintains and stores information; provides an interface between perception, memory, and action.
- **Working memory capacity:** One's ability to hold and manipulate information in conscious attention.

Long-Term Memory

- **Long-term memory:** An unlimited-capacity store that can hold information over lengthy periods of time.
- A study was done in which stimulation on the temporal lobe in patients sometimes elicited vivid descriptions of events long past.

- **Flashbulb memories:** Unusually vivid and detailed recollections of momentous events. They become less detailed and accurate with time.
    - For example, many people remember exactly what they were doing when they learned of the death of Michael Jackson.

How is Knowledge Represented and Organized in Memory?

- **Clustering:** The tendency to remember similar or related items in groups.
- **Conceptual hierarchy:** A multilevel classification system based on common properties among items.
    - A study showed that subjects remember more information when they organize it into a conceptual hierarchy.

Schemas:
- **Schema:** An organized cluster of knowledge about a particular object or event abstracted from previous experience with the object or event.
    - For example, subjects have schemes for what professors' offices look like. After visitation, most subjects recalled seeing desks and chairs, but few recalled the objects that are not part of the typical office schema (but were actually present in that office – such as wine bottle and picnic basket). Some even falsely recalled books.
    - People are more likely to remember things that are consistent with their schemas than things that are not.
    - The opposite is also true: People better remember things that violate their schema-based expectations.

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Semantic Networks:

- A **semantic network** consists of nodes representing concepts, joined together by pathways that show how the concepts are related.

* Refer to image on page 26

- The length of each pathway represents the degree of association between the two concepts. Shorter pathways imply stronger associations.
- Semantic networks have proven useful in explaining why thinking about one word (such as butter) can make a closely related word (such as bread) easier to remember.

Connectionist Networks and Parallel Distribution Processing (PDP) Models:

- **Connectionist, or PDP** models assume that cognitive processes depend on patterns of activation in highly interconnected computational networks and *resemble neural networks*.

Retrieval: Getting Information out of Memory

Using Cues to Aid Retrieval

- **Tip-of-the-tongue phenomenon:** A temporary inability to remember something you know, accompanied by a feeling that it's just out of reach.

Reinstating the Context of an Event

- For example, try to remember what you have for breakfast two days ago. If you can't remember, you might imagine yourself sitting at the breakfast table trying you help yourself remember by putting yourself back into the context in which the event occurred. There are *context cues*.

Reconstructing Memories and the Misinformation Effect

- **Misinformation effect:** Occurs when participants' recall of an event they witnessed is altered by introducing misleading post-event information.
    - How/why does this happen? Probably because the of the persons *schema* of that particular event.

Source Monitoring and Reality Monitoring

- **Reality monitoring:** The process of deciding whether memories are based on external sources (our perception of actual events) or internal sources (our thoughts and imaginations).

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- People engage in reality monitoring when they reflect on whether something actually happened or they only thought about it happening.

- **Source monitoring:** The processes of making attributions about the origins of memories.
  - Memories don't come tagged with labels that specify their sources.
- **Destination memory:** Involves recalling *to whom* one has told what.

Forgetting: When Memory Lapse

- Forgetting can be caused by defects in encoding, storage, and retrieval.

How Quickly we Forget: Ebbinghaus's Forgetting Curve

- Ebbinghaus's **forgetting curve** concluded that most forgetting occurs very rapidly after learning something.
- He used "nonsense syllables" in this study (constant-vowel-constant)

Measures of Forgetting

- **Retention interval** is the length of time between the presentation of materials to be remembered and the measurement of forgetting.
- The three principal methods used to measure forgetting are recall, recognition, and relearning.
- **Recall:** A memory test that requires subjects to reproduce information on their own without any cues.
- **Recognition:** A memory test that requires subjects to select previously learned information from an array of options.
- **Relearning:** A memory test that requires a subject to memorize information a second time to determine how much time or effort is saved by having learned it before.

Why we Forget?

Ineffective Encoding:

- The information in question may never have been inserted into memory in the first place!

Decay:

- **Decay theory:** The idea that forgetting occurs being memory traces fade with time.

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- However, research has shown that forgetting depends not on the amount of time that has passed since learning but on the amount, complexity, and type of information that subject have had to assimilate during the retention interval.

Interference:

- **Interference theory:** The idea that people forget information because of competition from other material.
- There are two kinds of interference:
    - **Retroactive interference:** When new information impairs the retention of previously learned information.
    - **Proactive interference:** When previously learned information interferes with the retention of new information.

Retrieval Failure:

- Retrieval failures may be more likely when a mismatch occurs between the retrieval cues and the encoding of the information you're searching for.
    - For example, if the sound of a world was emphasized during encoding, an effective retrieval cue should emphasize the sound of the word.

Motivational Forgetting:

- An explanation by Freud.
- The tendency to forget things one doesn't want to think about (distressing thought) is called **motivational forgetting** (aka **repression**).
    - Buried in unconscious thought.

<u>Seven Sins of Memory: How Memory Goes Wrong</u>

- Transience: Weakening of a memory over time (decay).
- Absentmindedness: Failure to pay attention because we were perhaps preoccupied with other things.
- Blocking: Similar to tip-of-the-tongue phenomenon.

^ There three memory sins are sins of omission in which we cannot bring the memory to mind.

- The next four memory signs are sins of commission which are memory problems where some type of memory is present, but the memory is either incorrect or unwanted.

- Misattribution: Assigning a memory to the wrong source.
- Suggestibility: Distortion of memory because of misleading questions.

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- Bias: Inaccuracy due to the effect of our current knowledge on our reconstruction of the past.
- Persistence: Unwanted memories that you cannot forget (they haunt you).

In Search of the Memory Trace: The Physiology of Memory

The Neural Circuitry of Memory

- The hippocampus in the medial temporal lobe is thought to play a critical role in the consolidation of long-term memories.
- Evidence of long-term potentiation also supports the idea that memory traces consist of specific neural circuits.
- **Long-term potentiation (LTP):** A long-lasting increase in neural excitability at synapses along a specific neural pathway.

The Anatomy of Memory

- There are two basic types of amnesia:
  - **Retrograde amnesia:** Loss of memories for events that occurred prior to a head injury.
  - **Anterograde amnesia:** Loss of memories for events that occur after a head injury.

Systems and Types of Memory

Types of Long-Term Memory: Implicit vs. Explicit Memory

- **Implicit memory:** Type of memory apparent when retention is exhibited on a task that *does not* require intentional remembering or conscious recall.
  - For example, filling in the missing letters of a word (could be many words but subjects wrote the word from the list they were presented earlier even though they don't recall being presented that list. This is an indirect technique.
  - Another example is typing; our fingers go towards the letters as desired but we would not be able to list to letters on a keyboard in order.
  - This type of memory enables us to perform specific learned skills or habitual responses such as riding a bike or tying your shoe laces.

- **Explicit memory:** Intentional recollection of previous experiences. With conscious recall.

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- Our implicit memory for events can continue to affect our behaviour long after our explicit/conscious memory has deteriorated.

Declarative vs. Procedural Memory (memory systems)

- **Declarative memory:** Memory for factual information.
- **Procedural memory:** Memory for actions, skills, and operations.
- Declarative memory is more easily forgotten then procedural memory.
- Procedural memories are implicit because we don't have to consciously remember the steps involved in these actions to perform them.
- Declarative memories are explicit.

Semantic vs. Episodic Memory

- Endel Tulving further subdivided explicit (aka declarative) memory into episodic and semantic memory.
- **Episodic memory** contains personal facts.
- **Semantic memory** contains general facts.
    - Information in your semantic memory is usually stored undated; you don't quite remember when you learned these facts.

Prospective vs. Retrospective Memory

- **Prospective memory:** The ability to remember to perform actions in the future.
- **Retrospective memory:** The ability to remember events from the past or previously learned information.

* Refer to pg 74 (concept check)

- **Serial-position effect:** The fact that subjects show better recall for items at the beginning and end of a list than for items in the middle.

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